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best methods of meeting the necessities of his particular branch of trade, would comprehend at a glance the effect of the proposed principles of settlement; while to give a stranger, not quite familiar with the subject, any clear idea of our present methods of dealing with claims under average policies, is known to be a task of no ordinary difficulty.

The clause proposed to compass the intended alteration would stand in the following form, probably admitting, after reflection, of further abridgment and improvement:—

“It is hereby declared and agreed that this Company shall be liable only for such a proportion of any loss as the sum insured by this policy may bear to the full value of the property covered.

“And it is further declared and agreed, that if the assured shall be also insured by any other Company on property wholly or partially covered by this policy, then this Company will bear its share of the loss in the proportion that the amount of its liability may bear to the amount of the liability of any other policy or policies separately ascertained.”

Having now submitted the topic for consideration to those who may feel interested in its discussion, it is left without further comment or recommendation: with the full conviction, however, in the mind of the writer, that no practical difficulties lie in the way of making the change, that ought to weigh, for a moment, against the many advantages which would certainly result from its adoption.

On the Advantages to Statistical Science of an Uniform Decimal System of Measures, Weights, and Coins, throughout the World.
By SAMUEL BROWN, Esq., F.S.S., and Vice-President of the Institute of Actuaries.

[Read before Section F.—Economic Science and Statistics—of the British Association for the Advancement of Science, at Cheltenham, on Tuesday, the 12th of August, 1856.]

SINCE the establishment of the Statistical Society of London, so great an impetus has been given in this country to the study of statistics, that probably in no branch of knowledge have more important results been produced in the same time. This arises in a great measure from the very nature of statistics, and from the universality of their application. Every science, the facts of which can be expressed in a tabular form, comes within their range; and the great object of those who desire to elevate the character of statistics

in the mind of the philosopher or the man of science is, to show how, by a correct and methodical classification of facts of every kind, the boundaries of knowledge are enlarged, new laws developed, and new theories suggested.

There are few facts relating to material objects in which weight and measure do not form principal points in the comparison ; and if the comparison be made for commercial purposes, value also becomes a prominent consideration. Whoever has undertaken, for statistical purposes, to reduce a collection of facts to one measure for comparison, will recall the immense labour which the system of measures, weights, and coins, prevalent even in this country, has caused him. If, in addition to this, it be desired to make the comparison of the results with similar tables of other countries, how much additional labour is thrown upon him ! In fact, so disheartening is the process, and so small the result compared with the toil to be undergone, that a vast amount of information is lost which could otherwise be turned to the most useful purposes. The attention which has been lately paid to the study of statistics has not been confined to this country. The reports which have emanated from the Statistical Congresses held in Brussels and Paris, show what a number of able and industrious men have been engaged in collecting facts in all departments of science, and what masses of materials are accumulating for those who are willing to undertake the labour of reducing them to a common form. Government publications on commerce, labour, and population, those of private individuals earnestly striving in various ways for the common good, and reports from public institutions, daily issue from the press of different countries ; but expressed in symbols so different, and containing so few points of comparison, that they are in a great measure unavailable even to those who are most directly interested in the questions to which they relate.

This difficulty has of late been felt so strongly, since the frequent assemblages of men interested in science or commerce, that scarcely any meeting of consequence has been held without an expression of opinion on the incongruities of existing systems, and the importance of preparing the way for a change. At the Statistical Congress at Brussels in 1853, a resolution was carried recommending that, in the statistical tables of countries not possessing the metrical system, a column should be added indicating the metrical reductions of weights and measures. Previous to this, however, the great difficulty of comparing the measure, weight and value of articles from so many different countries as were repre-

sented in the Great Exhibition of 1851 had forced the subject on the attention of the jurors. In every year since then an addition has been made to the number and influential position of those who advocate some uniform system. The resolution above quoted only partially removes the difficulty. It merely suggests the advantages of reducing all measures and weights to the metrical system, which is already extensively recognized; but it does not provide the means of dispensing altogether with the great labour required in the reduction.

The declaration signed by the members of the International Jury of the Great Exhibition in Paris, or Commissioners sent by their respective Governments to the Exhibition, takes a more comprehensive view; and, without pledging themselves to the support of any particular system, they urge "upon the consideration of their respective Governments and of enlightened individuals, friends of civilization and advocates for peace and harmony throughout the world, the adoption of an uniform system of weights and measures, computed decimally both in regard to its multiples and divisions, and also in regard to the elements of all the different units."

At the Statistical Congress held in Paris last year, after a discussion originated by Mr. Pent, a resolution was passed still further extending the objects to be aimed at, and applying it expressly to the purposes of the meeting. "The Congress, considering how much the adoption by different nations of a uniform system of measures, weights and coins, would facilitate the comparative study of the statistics of different countries, resolves that it is desirable to put such an uniform system into energetic practice."

Of the extraordinary labour which attends the comparison of the statistics of different countries at the present time, no better idea could be given than by a little work, containing only a few pages, which was prepared and published by Mr. Woolhouse in 1836, and which is still used by architects and contractors whose operations are carried on in foreign countries: it is entitled, *Tables of Continental Lineal and Square Measures*. Table I. contains a list of the principal lineal measures of the various countries, states and cities throughout Europe, arranged in an alphabetical order. The columns exhibit to four places of decimals the value of an unit of each respective measure, when estimated in English feet, Florence braccia, French metres, Neapolitan palmi, Rhineland feet, Roman palmi, Venice feet, and Vienna feet. Under each column the number of different places in which the unit of measure is compared, under Table I., amounts to 143, nearly all forming different

proportions of the English foot. In the second table is shown the comparison of square and superficial measures for the same number of places.

In the French *Annuaire* for the year 1835, published by the Bureau des Longitudes, a very elaborate series of tables is given, showing a comparison of the French measures, weights and coins, comprised in the metrical system, with those of all the leading commercial countries. They occupy 120 pages, and are carried in some cases to seven or eight places of decimals. What would be the impression produced on the mind of any writer on statistics who wished to convey to an English reader a general comparison of any single collection of facts comprising measure, weight, and value, with a similar collection of facts for other commercial countries? No doubt, amongst the laborious and talented men whose names are enrolled in this Section, some might be found willing to attempt the herculean task; but how many more would be deterred by the waste of their energies, and, still more, of their valuable time, which might in the meantime be devoted to subjects perhaps less extensive, but more likely to repay their toil with results beneficial to their own country!

The statistics of the commerce of foreign countries with our own must, however, constantly afford subjects for reflection of the very highest importance. The exports and imports, compared with the population, would exhibit to the mind of the philosopher or the statesman the relative progress of every country in wealth and social improvements; and if any diminution were perceived, an inquiry into the causes would be instituted, and the remedy applied. But it is evident, no safe conclusions could be drawn from observations of facts so affecting the position or progress of any nation in its commercial character, till those relating to all other nations had been reduced to the same measure or standard; and, under existing systems, small hope could be entertained of an efficient inquiry whilst the labour of reduction is so vast.

It is not my intention, in this place, and with the short time that can be allowed, to advocate any particular system for universal use. The subject involves too many important interests not to require a full discussion to itself; and it would appear to me that the only reasonable plan of arriving at permanent results would be, either for a leading European Government, or for those taking a warm interest in the subject, to call a general Congress, at which delegates from the Governments, from scientific bodies, and from the commercial interests, of every country, should be deputed to

discuss this great international question, and endeavour to agree either upon some common system or upon one which might be used by all countries with the least discordancy. If, for instance, it should be found inadvisable to agree upon the same money unit, from the great derangement it would cause in the monetary accounts of some countries, it might be possible to make the money unit of one country a simple multiple of the other; and, by agreement, to cause the coins, when properly stamped and authorized, to pass current for their equivalent value in another. Thus even the supporters of the "pound and mil" scheme, as it is called, might be prepared to admit that £1 sterling should be made equal to 25 francs; so that, by a simple multiplication of every 100 francs by 4, and cutting off two decimal places, we should have the equivalent in pounds sterling. The coinage question is not necessarily connected with the system of weights and measures, and it would be very desirable that the latter at least should be uniform throughout all commercial countries; for if in each measure of surface or solidity, and in weight, the existing unit of each country were assumed as the basis, the labour would still be very great in making the reductions where the statistics of more than two countries were compared together.

In the discussion which took place at the Institution of Civil Engineers, in February 1854, Professor Airy stated, that for every different class of objects a different unit was adopted; that the multiples of that unit were counted by the decimal scale of common arithmetic, and the subdivisions of that unit by the binary scale. Thus he enumerates

- The acre (for land measure),
- The mile (for itinerary measure),
- The yard (for measure of drapery),
- The coomb (for capacity of corn, &c.),
- The gallon (for capacity of liquids),
- The pound (for grocers' ware),
- The stone of 8 pounds (for butchers' meat),
- The stone of 14 pounds (for flour, oatmeal, &c.);

and the learned Professor did not consider that the Government ought to enforce a decimal scale, except in coinage.

Now it is evident, that if so many units are to be maintained, having no connection with or relation to each other, and if they are not even to be divided decimally, and if foreign nations may each have as many units equally unrelated to each other, no great advantage would be gained by any change at all. If the inconvenience of an alteration of system must be encountered, the one

adopted should at least be of such a kind that no further change should be necessary, that the system should be decimal for the convenience of calculation, that it should be distinguished by the utmost simplicity, and that both measures and weights should be in harmony with each other.

At the present time, no system so completely fulfils these conditions as the metrical system, which, beginning in France, has been since established in so many countries, and from which, whatever prejudices it may have to overcome, there seems no desire, in any country where it has been introduced, to withdraw or to substitute any old system for it. Both in weights and measures, the difference is so slight between some denominations of the metrical system and some used in this country, that very little inconvenience would be felt in the change. Thus the ton = 1015·65 kilogrammes, might easily be altered to 1,000 kilogrammes ;

1 pole or perch ($5\frac{1}{2}$ yards)	=	5·029 mètres,	to	5 mètres;
1 furlong (220 yards)	=	201·164	„	200 „
5 furlongs	=	1005·822	„	1 kilomètre;
1 foot	=	3·048	decimètres,	to 3 decimètres.

Leaving, however, at present, the question as to which system could be introduced with the least trouble or derangement, it would be sufficient to affirm a resolution that some uniform system is desirable, and to urge at an early period on the attention of this and other Governments the great importance of summoning a Congress at which the whole bearings of the question might be discussed, and at which the various scientific or commercial interests affected by the change might be fairly represented. The advantages of submitting great public questions to assemblies of enlightened and impartial men for discussion could not be better illustrated than by the success of the British Association, every meeting of which has tended to a further development of knowledge, and every year achieved a new triumph. Even if unsuccessful in its results, a vast amount of information would be gathered at such a Congress ; but if the delegates could agree on some uniform decimal system of measures, weights, and coins, there are few methods that could be devised more calculated to facilitate the commerce, add to the prosperity, or secure the permanent peace and cordial intercourse, of all nations.
